

# Calibration Update

SWAMP Meeting  
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NASA/GSFC

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- Instrument Calibration/Cross-calibration

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## Radiometric Measurement Comparisons

-Second ASTER Radiometric Comparison held November 1996 at NEC, Yokohama and at Mitsubishi Electronics, Kamakura, Japan.

- Participants:

- National Research Laboratory of Metrology (NRLM) (vnir and swir)
- NIST (vnir)
- University of Arizona (vnir and swir)
- NASA's GSFC (vnir and swir)

- $\leq \pm 2\%$  spread of preliminary visible/near infrared radiometric measurements by participating radiometers on ASTER VNIR sphere at NEC consistent with February 1995 results.

- $\leq \pm 5\%$  spread of preliminary shortwave infrared radiometric measurements by participating radiometers on ASTER SWIR sphere at Melco for wavelengths below  $2.2 \mu\text{m}$ .  $\leq \pm 1.5\%$  spread of U of A and NRLM measurements at 1.6 and  $2.2 \mu\text{m}$ .

- Article on this radiometric comparison to appear in next EOS Observer followed by refereed publication. Comparison data to be archived either in Website or at GSFC DAAC.

Radiometric Measurement Comparisons (con't.)

-Articles on previous radiometric comparisons:

- February 1995 ASTER sphere comparison at NEC:
  - SPIE vol. 2820, pp. 184-196 (1996).
- February 1995 OCTS sphere comparison at NEC:
  - Paper to be submitted to NIST Journal of Research, 1997.
- August 1996 MODIS, ETM+ sphere comparison at Hughes SBRS:
  - Description of comparison in The Earth Observer vol. 8, no. 5 pp. 17-19 (1996).
  - Data analysis underway and technical publication in progress.
- August 1996 MISR sphere comparison at JPL: data analysis underway.
  - Description of comparison in The Earth Observer vol. 8, no. 5 pp. 17-19 (1996).
  - Data analysis underway and technical publication in progress.

## Radiometric Measurement Comparisons (con't.)

-Second MODIS Radiometric Measurement Comparison tentatively scheduled for first week of June, 1997.

- Possible participants: NIST, U of A, NASA's GSFC (Code 920.1 and 923), and NRLM.
- Repeat of August 1996 comparison on SIS(100).

## Radiometric Measurement Comparisons (con't.)

### -Status of NIST/EOS Shortwave and Thermal Infrared Radiometers

- SWIR radiometer is currently being designed and will be a grating instrument. Initial deployment will be in early 1998.
- Thermal infrared radiometer will be ready for initial deployment to AM-1 instrument calibration facilities in late Fall 1997.
- An initial e-mail will be sent to MODIS, CERES, ASTER, and MOPITT instrument managers requesting information on blackbody and thermal vacuum availability in the late Fall timeframe.
- A second e-mail will follow the first containing technical and logistical questions about the instrument calibration blackbodies and thermal vacuum chambers.

## BRDF Round-robin

- Program to validate the BRDF measurements made by EOS instrument builders, secondary standards labs, and vicarious calibration labs.
- Participating facilities and NIST make BRDF measurements on a common set of diffuse targets at a number of visible/near infrared/shortwave infrared wavelengths and over a range of incident and scatter angles.

## BRDF Round-robin (con't.)

-Status of program

Date	Measuring Facility	Status
December 1996	NIST	Complete
December 1996-January 1997	NASA's JPL	Complete
January 1997-February 1997	NIST	Complete
February-March 1997	U. of Arizona	Complete
March-April 1997	NIST	In Progress
April 1997	Hughes SBRS	
April-May 1997	NIST	
May 1997	NASA's GSFC	
May-June 1997	NIST	



## USGS/Northern Arizona University (NAU) Lunar Radiometry

- Visible/near infrared lunar radiometric images are being acquired on every clear night during the bright half of the lunar month.

- Anticipate a Spring 1997 delivery of shortwave infrared camera system.

- Due to the potential variety of user computer platforms involved, algorithms will be delivered rather than software for use in comparing EOS instrument lunar images and lunar radiometric images. Input and output for an appropriate test case will be available on an FTP site to compare with the results of user installations.

- Lunar radiometric images are beginning to be archived at the GSFC DAAC.

## AM-1 Calibration Attitude Maneuvers (CAMs)

-On October 31, 1996, a letter was delivered to the EOS AM Project recommending the design and study of a pure pitch maneuver which meets a number of instrument-specific and platform requirements. This letter was delivered after having obtained EOS AM-1 PI concurrence.

- In addition to the pure pitch maneuver, small ( $\leq 30^\circ$ ) yaws, rolls, and pitches of the platform are possible (e.g. CERES  $11^\circ$  yaw over North Pole to enable solar calibration; MODIS  $\pm 15^\circ$  yaw over North Pole for on-orbit solar diffuser characterization).

## 1997 Vicarious Calibration Field Campaign

- The May 1996 vicarious calibration field campaign at Railroad Valley/Lunar Lake, NV, identified several areas which contributed to differences in the participants' radiance and reflectance measurements.

- These areas included atmospheric aerosols (optical depth and size), incident TSI, radiative transfer codes, atmospheric absorption, and surface reflectance.

- As a prelude to the 1997 campaign, visible/nir/swir and tir laboratory measurement comparisons will be held June 16-20 in Tucson, AZ and in Pasadena, CA, respectively.

- In Tucson: reflectance standard comparisons; vis/nir/swir field radiometer and sun photometer measurement comparisons.

- In Pasadena: blackbody standard comparisons; tir field radiometer measurement comparisons.

- Following the laboratory measurement comparisons:

- June 21-22: travel and setup at Railroad Valley/Lunar Lake, NV

- June 23-27: instrument checkout and measurement comparisons in the field

- June 27: joint vicarious calibrations of Landsat

## Calibration Panel Meeting

- Propose meeting be held July 8-10 at GSFC.

## Level 1B ATBD Reviews

- EOS Project Science Office Calibration and NIST representatives participated in three rounds of level 1B ATBD panel and written reviews.

- November 1996: MODIS, CERES, MISR

- December 1996: ASTER, MOPITT

## Calibration Homepage

-In process of being populated with background, schedule and contact information on the following activities:

-Pre-flight EOS Instrument Calibration:

- Instrument Calibration Plans
- Calibration Peer Reviews
- Radiometric Measurement Comparisons
- EOS Calibration Panel
- Artifact Round-robins

-Post-launch EOS Instrument Calibration:

- On-orbit Platform Maneuvers (a.k.a. Calibration Attitude Maneuvers)
- USGS/NAU Lunar Radiometric Measurement Program]
- Vicarious Calibration Campaigns

-Calibration homepage URL:

<http://eosps0.gsfc.nasa.gov/calibration/calpage.html>